

**WHAT IS CLAIMED IS:**

1. A method for monitoring a pipeline for accumulation of materials within the  
5 interior of the pipeline, if any, comprising:
  - a) making a first temperature measurement of the outside surface of the pipeline at a first point downstream from the influent;
  - b) making a second temperature measurement of the outside surface of the pipeline at a second point downstream from the first point; and
  - 10 c) using the temperature measurements to determine:
    - (i) the location of material forming the accumulation within the pipeline, if any;
    - (ii) the amount of material forming the accumulation within the pipeline, if any;
    - (iii) composition of material forming the accumulation within the pipeline, if any; or
    - 15 (iv) any combination of two or more of (i), (ii), (iii).
2. The method of Claim 1 wherein the influent is a production fluid from an oil or gas well.
- 20 3. The method of Claim 2 wherein the pipeline is an undersea pipeline.
4. The method of Claim 3 wherein the materials accumulating within the pipeline, if any, are selected from the group consisting of paraffins, asphaltenes, scale, water, hydrates, and mixtures thereof.
- 25 5. The method of Claim 1 wherein the pipeline is a flowline.

6. The method of Claim 1 wherein the temperature measurements of the outside surface of the pipeline is made using an optical fiber distributed sensor array.
- 5 7. The method of Claim 6 wherein a temperature measurement is made at an interval of from 1 to 1000 meters along the length of the pipeline.
8. The method of Claim 7 wherein a temperature measurement is made at an interval of from 10 to 100 meters along the length of the pipeline.
- 10 9. The method of Claim 7 wherein the temperature measurements are used to prepare a temperature profile.
- 15 10. The method of Claim 9 wherein the temperature profile is prepared using a computer.
11. The method of Claim 10 wherein the temperature profile is prepared in real time.
- 20 12. The method of Claim 1 additionally comprising treating the pipeline to reduce the accumulation of material within the pipeline, if any.
13. The method of Claim 1 wherein the accumulation of materials within the interior of the pipeline, if any, is in the form of a solid deposit on the interior surface of the pipeline.
- 25 14. The method of Claim 1 wherein the accumulation of materials within the interior of the pipeline, if any, is in the form of a held up water phase.

15. The method of Claim 14 wherein the held up water phase fills a section of the pipeline and the influent into the pipeline includes methane.

16. The method of Claim 17 wherein the accumulation of materials within the interior of the pipeline, if any, is methane hydrate.

17. The method of Claim 1 additionally comprising measuring the temperature of the influent into a pipeline.

18. A pipeline monitoring system for performing the method of Claim 1 comprising a pipeline, an internal temperature sensor within the pipeline, a first external sensor array in contact with the exterior of the pipeline, and a computer capable of accessing the data from the internal temperature sensor and first external sensor array.

19. The system of Claim 18 wherein the external sensor array is an optical fiber distributed sensor array.

20. The system of Claim 19 additionally comprising a second external sensor array in contact with the exterior of the pipeline.

21. The system of Claim 20 wherein the first external sensor array is along the bottom of the pipeline and the second external sensor array is along the top of the pipeline.

22. The system of Claim 18 additionally comprising a system for treating the influent to the pipeline to reduce the accumulation of materials with the interior of the pipeline.

23. The system of Claim 1 wherein the system for treating the influent to the pipeline is a SENTRY system.